



SEQUENCE LISTING

<110> Stephen M. Allen
Gary M. Fader
Saverio Carl Falco
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Jonathan E. Lightner
Guo-Hua Miao
J. Antoni Rafalski
Catherine J. Thorpe

<120> Plant Cellulose Synthases

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NOV 07 2002

TECH CENTER 1600/2900

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 Cys Pro Gln Cys Lys Thr Arg Tyr Lys Arg Leu Lys Gly Cys Gln Arg
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Ser	Leu	Pro	Val	Gln	Pro	Arg	Ser	Met	Asp	Pro	Ser	Lys	Asp	Leu	Ala	195	200	205
Ala	Tyr	Gly	Tyr	Gly	Ser	Val	Ala	Trp	Lys	Glu	Arg	Met	Glu	Asn	Trp	210	215	220
Lys	Gln	Arg	Gln	Glu	Arg	Met	His	Gln	Thr	Gly	Asn	Asp	Gly	Gly	Gly	225	230	235
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Arg	Met	Ile	Ile	Ile	Ile	Arg	Leu	Val	Val	Leu	Gly	Phe	Phe	Phe	His	275	280	285
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Lys	Val	Ser	Cys	Tyr	Val	Ser	Asp	Asp	Gly	Ala	Ala	Met	Leu	Thr	Phe	385	390	395
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Gln	Lys	Ile	Asp	Tyr	Leu	Lys	Asp	Lys	Val	Ala	Ala	Asn	Phe	Val	Arg	435	440	445
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Pro	Ile	Tyr	Val	Gly	Thr	Gly	Cys	Val	Phe	Arg	Arg	Gln	Ala	Leu	Tyr	625	630	635
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Cys	Trp	Pro	Lys	Trp	Cys	Phe	Cys	Cys	Cys	Cys	Phe	Gly	Asn	Arg	Lys	660	665	670
Gln	Lys	Lys	Thr	Thr	Lys	Pro	Lys	Thr	Glu	Lys	Lys	Lys	Leu	Leu	Phe	675	680	685
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Trp	Val	Ile	Val	His	Leu	Tyr	Pro	Phe	Leu	Lys	Gly	Leu	Val	Gly	Arg	1025	1030	1035	1040
Gln	Asn	Arg	Thr	Pro	Thr	Ile	Val	Ile	Val	Trp	Ser	Ile	Leu	Leu	Ala	1045	1050	1055	
Ser	Ile	Phe	Ser	Leu	Leu	Trp	Val	Arg	Ile	Asp	Pro	Phe	Leu	Ala	Lys	1060	1065	1070	
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<211> 1138

<212> DNA

<213> Oryza sativa

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Gln	Cys	Lys	Thr	Arg	Tyr	Lys	Arg	Leu	Lys	Gly	Ser	Pro	Arg	Val	Glu
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Gly	Asp	Asp	Asp	Glu	Glu	Asp	Val	Asp	Asp	Ile	Glu	His	Glu	Phe	Asn
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Ser	Ser	Leu	His	Lys	Arg	Val	His	Pro	Tyr	Pro	Val	Ser	Glu	Pro	Gly
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Phe	Pro	Ile	Asp	Arg	Glu	Thr	Tyr	Leu	Asp	Arg	Leu	Ser	Ile	Arg	Tyr	305	310	315	320
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His	Lys	Lys	Ala	Gly	Ala	Met	Asn	Ala	Leu	Val	Arg	Val	Ser	Ala	Val	515	520	525	
Leu	Thr	Asn	Ala	Pro	Phe	Met	Leu	Asn	Leu	Asp	Cys	Asp	His	Tyr	Val	530	535	540	
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Gln	Thr	Gly	Lys	Lys	Val	Cys	Tyr	Val	Gln	Phe	Pro	Gln	Arg	Phe	Asp	565	570	575	
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Glu	Ala	Ala	Ser	Leu	Lys	Gly	Met	Asp	Asp	Asp	Lys	Glu	Val	Leu	Met
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Trp	Arg	Asn	Glu	Gln	Phe	Trp	Val	Ile	Gly	Gly	Val	Ser	Ala	His	Leu
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Phe	Ala	Val	Ile	Gln	Gly	Leu	Leu	Lys	Val	Leu	Ala	Gly	Ile	Asp	Thr
			900					905					910		
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		915					920					925			

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 945 950 955 960
 Asn Asn Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe
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 Ser Phe Trp Val Ile Val His Leu Tyr Pro Phe Leu Lys Gly Leu Met
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 Gly Arg Gln Asn Arg Thr Pro Thr Ile Val Val Ile Trp Ser Val Leu
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 <213> Glycine max

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Val	Phe	Leu	Gly	His	Ser	Gly	Gly	Leu	Asp	Thr	Asp	Gly	Asn	Glu	Leu
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His	Lys	Lys	Ala	Gly	Ala	Met	Asn	Ala	Leu	Ile	Arg	Val	Ser	Ala	Val
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Asn	Asn	Ser	Lys	Ala	Leu	Lys	Glu	Ala	Met	Cys	Phe	Met	Met	Asp	Pro			
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Asp	Ile	Asn	Met	Lys	Gly	Gln	Asp	Gly	Val	Gln	Gly	Pro	Val	Tyr	Val			
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Thr	Asn	Pro	Ala	Thr	Leu	Leu	Lys	Glu	Ala	Ile	His	Val	Ile	Ser	Cys			
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Tyr	Gly	Tyr	Asn	Gly	Lys	Leu	Lys	Pro	Leu	Met	Arg	Leu	Ala	Tyr	Ile			
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Ile	Ser	Asn	Phe	Ala	Ser	Met	Trp	Phe	Ile	Leu	Leu	Phe	Val	Ser	Ile
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Tyr	Ala	Ile	Asn	Ser	Gly	Tyr	Gln	Ser	Trp	Gly	Pro	Leu	Phe	Gly	Lys
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Leu	Phe	Phe	Ala	Ile	Trp	Val	Ile	Ala	His	Leu	Tyr	Pro	Phe	Leu	Lys
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Gly	Leu	Leu	Gly	Arg	Gln	Asn	Arg	Thr	Pro	Thr	Ile	Val	Ile	Val	Trp
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Ser	Val	Leu	Leu	Ala	Ser	Ile	Phe	Ser	Leu	Leu	Trp	Val	Arg	Ile	Asp
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Asn Cys
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 gatcggaggt gtttcttccc atctatattgc cctatttcag ggtttactga aggtcttggc
 1980
 tgggtgtgaac acaaacttca ctgtgacctc aaaagcagca gatgatggag aattctcaga
 2040
 actctacata ttcaagtgga catcactctt gatccctcca atgactttac ttatcatgaa
 2100

tattgtcggg gtggttgtcg ggatctcaga tgccatcaac aatggttatg actcatgggg
2160
acctctcttt ggtagattgt tctttgcatt gtgggtgatc ctccatctct accccttctt
2220
gaaggggttg cttggaaaac aagatagaat gcccaaccatt atattggttt ggtcaatcct
2280
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2340
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2400
aagaagggtt agttatTTTT cagctacact gcagtcatgt tgaagaatgc agccagcaca
2460
tgcttcacaa agttgcacga attttcggat ggaagtttta tttttcgggt gtgtagagat
2520
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2580
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2640
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2700
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2760
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2890

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<211> 793
<212> PRT
<213> Glycine max

<400> 18
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20 25 30
Pro Lys Trp Tyr Pro Ile Gln Arg Glu Thr Tyr Leu Asp Arg Leu Ser
35 40 45
Leu Arg Tyr Glu Lys Glu Gly Lys Pro Ser Glu Leu Ser Ser Val Asp
50 55 60
Val Phe Val Ser Thr Val Asp Pro Met Lys Glu Pro Pro Leu Ile Thr
65 70 75 80
Ala Asn Thr Val Leu Ser Ile Leu Ala Val Asp Tyr Pro Val Asp Lys
85 90 95
Val Ala Cys Tyr Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe Glu
100 105 110
Ala Leu Ser Glu Thr Ser Glu Phe Ala Arg Arg Trp Val Pro Phe Cys
115 120 125
Lys Lys Tyr Asn Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Gly Gln

130					135					140					
Lys 145	Met	Asp	Tyr	Leu	Lys 150	Asn	Lys	Val	His	Pro 155	Ala	Phe	Val	Arg	Glu 160
Arg	Arg	Ala	Met	Lys 165	Arg	Asp	Tyr	Glu	Glu 170	Phe	Lys	Val	Arg	Ile	Asn 175
Ser	Leu	Val	Ala 180	Thr	Ala	Gln	Lys	Val 185	Pro	Glu	Asp	Gly	Trp 190	Thr	Met
Gln	Asp	Gly 195	Thr	Pro	Trp	Pro	Gly 200	Asn	Asn	Val	Arg	Asp 205	His	Pro	Gly
Met 210	Ile	Gln	Val	Phe	Leu	Gly 215	Gln	Asp	Gly	Val	Arg 220	Asp	Val	Glu	Gly
Asn 225	Glu	Leu	Pro	Arg	Leu 230	Val	Tyr	Val	Ser	Arg 235	Glu	Lys	Arg	Pro	Gly 240
Phe	Asp	His	His	Lys 245	Lys	Ala	Gly	Ala	Met 250	Asn	Ala	Leu	Val	Arg 255	Ala
Ser	Ala	Ile	Ile 260	Thr	Asn	Ala	Pro	Tyr 265	Leu	Leu	Asn	Val	Asp 270	Cys	Asp
His	Tyr	Ile 275	Asn	Asn	Ser	Lys	Ala 280	Leu	Arg	Glu	Ala	Met 285	Cys	Phe	Met
Met 290	Asp	Pro	Gln	Leu	Gly	Lys 295	Lys	Val	Cys	Tyr	Val 300	Gln	Phe	Pro	Gln
Arg 305	Phe	Asp	Gly	Ile	Asp 310	Arg	His	Asp	Arg	Tyr 315	Ser	Asn	Arg	Asn	Val 320
Val	Phe	Phe	Asp	Ile 325	Asn	Met	Lys	Gly	Leu 330	Asp	Gly	Ile	Gln	Gly 335	Pro
Ile	Tyr	Val	Gly 340	Thr	Gly	Cys	Val	Phe 345	Arg	Arg	Tyr	Ala	Leu 350	Tyr	Gly
Tyr	Asp	Ala 355	Pro	Ala	Lys	Lys	Lys 360	Pro	Pro	Ser	Lys	Thr 365	Cys	Asn	Cys
Trp 370	Pro	Lys	Trp	Cys	Cys	Leu 375	Cys	Cys	Gly	Ser	Arg 380	Lys	Lys	Lys	Asn
Ala 385	Asn	Ser	Lys	Lys	Glu 390	Lys	Lys	Arg	Lys	Val 395	Lys	His	Ser	Glu	Ala 400
Ser	Lys	Gln	Ile	His 405	Ala	Leu	Glu	Asn	Ile 410	Glu	Ala	Gly	Asn	Glu 415	Gly
Thr	Asn	Asn	Glu 420	Lys	Thr	Ser	Asn	Leu 425	Thr	Gln	Thr	Lys	Leu 430	Glu	Lys
Arg	Phe	Gly 435	Gln	Ser	Pro	Val	Phe 440	Val	Ala	Ser	Thr	Leu 445	Leu	Asp	Asp
Gly	Gly	Val	Pro	His	Gly	Val	Ser	Pro	Ala	Ser	Leu	Leu	Lys	Glu	Ala

450				455				460							
Ile	Gln	Val	Ile	Ser	Cys	Gly	Tyr	Glu	Asp	Lys	Thr	Glu	Trp	Gly	Lys
465					470					475					480
Glu	Val	Gly	Trp	Ile	Tyr	Gly	Ser	Val	Thr	Glu	Asp	Ile	Leu	Thr	Gly
				485					490					495	
Phe	Lys	Met	His	Cys	His	Gly	Trp	Arg	Ser	Val	Tyr	Cys	Ile	Pro	Lys
			500					505					510		
Arg	Pro	Ala	Phe	Lys	Gly	Ser	Ala	Pro	Ile	Asn	Leu	Ser	Asp	Arg	Leu
		515					520					525			
His	Gln	Val	Leu	Arg	Trp	Ala	Leu	Gly	Ser	Val	Glu	Ile	Phe	Phe	Ser
	530					535					540				
Arg	His	Cys	Pro	Ile	Trp	Tyr	Gly	Tyr	Gly	Gly	Gly	Leu	Lys	Leu	Leu
545					550					555					560
Glu	Arg	Phe	Ser	Tyr	Ile	Asn	Ser	Val	Val	Tyr	Pro	Trp	Thr	Ser	Leu
				565					570					575	
Pro	Leu	Leu	Val	Tyr	Cys	Thr	Leu	Pro	Ala	Ile	Cys	Leu	Leu	Thr	Gly
			580					585					590		
Lys	Phe	Ile	Val	Pro	Glu	Ile	Ser	Asn	Tyr	Ala	Ser	Leu	Val	Phe	Met
		595					600					605			
Ala	Leu	Phe	Ile	Ser	Ile	Ala	Ala	Thr	Gly	Ile	Leu	Glu	Met	Gln	Trp
	610					615					620				
Gly	Gly	Val	Ser	Ile	Asp	Asp	Trp	Trp	Arg	Asn	Glu	Gln	Phe	Trp	Val
625					630					635					640
Ile	Gly	Gly	Val	Ser	Ser	His	Leu	Phe	Ala	Leu	Phe	Gln	Gly	Leu	Leu
				645					650					655	
Lys	Val	Leu	Ala	Gly	Val	Asn	Thr	Asn	Phe	Thr	Val	Thr	Ser	Lys	Ala
			660					665					670		
Ala	Asp	Asp	Gly	Glu	Phe	Ser	Glu	Leu	Tyr	Ile	Phe	Lys	Trp	Thr	Ser
		675					680					685			
Leu	Leu	Ile	Pro	Pro	Met	Thr	Leu	Leu	Ile	Met	Asn	Ile	Val	Gly	Val
		690				695					700				
Val	Val	Gly	Ile	Ser	Asp	Ala	Ile	Asn	Asn	Gly	Tyr	Asp	Ser	Trp	Gly
705					710					715					720
Pro	Leu	Phe	Gly	Arg	Leu	Phe	Phe	Ala	Leu	Trp	Val	Ile	Leu	His	Leu
				725					730					735	
Tyr	Pro	Phe	Leu	Lys	Gly	Leu	Leu	Gly	Lys	Gln	Asp	Arg	Met	Pro	Thr
			740					745					750		
Ile	Ile	Leu	Val	Trp	Ser	Ile	Leu	Leu	Ala	Ser	Ile	Leu	Thr	Leu	Met
		755					760					765			
Trp	Val	Arg	Ile	Asn	Pro	Phe	Val	Ser	Arg	Asp	Gly	Pro	Val	Leu	Glu

770

775

780

Ile Cys Gly Leu Asn Cys Asp Glu Ser
785 790

<210> 19
<211> 1733
<212> DNA
<213> *Triticum aestivum*

<220>
<221> unsure
<222> (262)
<223> n = a, c, g or t

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ccacaaaggt ttgatgggtat tgataggaat gatcgatatg caaacaggaa cactgtcttt 120
tttgatatta acttgagggg ccttgacggc attcaaggac cagtttatgt gggaactggg 180
tgtgtttttca acagaacggc tatctatggg tatgagcccc caattaaggc gaagaagcca 240
ggtttcttgg catcattatg tnggggcaag aagaaggcaa gcaagtcaaa gaaaaggagc 300
tcagataaga aaaagtcgaa caagcatgtg gacagttctg ttccagtatt caatctcgaa 360
gacatagagg aggggtgttga aggtgctggg tttgatgatg agaaatcagt tctcatgtct 420
caaatgagct tagagaagag atttgccag tcagcagcat ttgttgcctc cactctgatg 480
gaatatgggt gtgttcctca gtcgtccact ccagaatctc ttttgaaaga agctatccat 540
gtcataagtt gtggctatga ggacaagtct gaatggggaa ctgagattgg ttggatctat 600
ggatctgtca cagaagatat tctaactgga ttcaagatgc acgcaagagg ctggcgttca 660
atctattgca tgcccaagcg cccagctttc aagggatctg ccccatcaa tctttcagat 720
cgtctgaatc aagtgtctgc gtgggctctt ggttctgttg aaattctttt cagccggcat 780
tgcccttat ggtatggcta cggagggcgc ctcaagttcc tggagagatt cgcttacatc 840
aacaccacca tttaccact aacctctctc ccgcttctag tctattgtat attgcctgct 900
atctgtctgc tcaactggaaa gttcatcatg ccagagatta gcaacttggc cagtatctgg 960
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1020 gttggcattg acgagtgggt gaggaatgaa cagttctggg tcattggagg
tatctctgcc 1080 catctgtttg ccgtctttca gggctctctg aagggtgctg
caggtatcga caccaacttc 1140 actgtcacct caaaggctaa tgatgaagaa
ggcgactttg ctgagctcta catgttcaag 1200 tggacgacgc ttcttatccc
tccgacgacc attttgatca ttaacatggg cgggtgtcgtt 1260 gctggtacct
cctacgccat caacagtggg taccaatcat gggggccgct ctttgggaag 1320
ctcttctttg ccttctgggt gattgttcac ttatacccat tctcaagggt tcttatgggc
1380 aggcaaaacc gcacaccgac gattgtcatc gtctgggctg tctcctcgc
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tcgctggccc aaatatccaa 1500 acctgtggca tcaactgcta ggaaagtggg
agtttgtaga gacagaaaat ataacagtga 1560 tcgagcgacc acctgtggag
ccagagaata tttatgttgg ggttgtgaat tactacgttt 1620 gagaaagttg
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1733

<210> 20
<211> 506
<212> PRT
<213> *Triticum aestivum*

<220>
<221> UNSURE
<222> (88)
<223> Xaa = any amino acid

<400> 20

Glu	Ala	Met	Cys	Phe	Leu	Met	Asp	Pro	Asn	Leu	Gly	Pro	Gln	Val	Cys	1	5	10	15
Tyr	Val	Gln	Phe	Pro	Gln	Arg	Phe	Asp	Gly	Ile	Asp	Arg	Asn	Asp	Arg	20	25	30	
Tyr	Ala	Asn	Arg	Asn	Thr	Val	Phe	Phe	Asp	Ile	Asn	Leu	Arg	Gly	Leu	35	40	45	
Asp	Gly	Ile	Gln	Gly	Pro	Val	Tyr	Val	Gly	Thr	Gly	Cys	Val	Phe	Asn	50	55	60	
Arg	Thr	Ala	Ile	Tyr	Gly	Tyr	Glu	Pro	Pro	Ile	Lys	Ala	Lys	Lys	Pro	65	70	75	80
Gly	Phe	Leu	Ala	Ser	Leu	Cys	Xaa	Gly	Lys	Lys	Lys	Ala	Ser	Lys	Ser	85	90	95	
Lys	Lys	Arg	Ser	Ser	Asp	Lys	Lys	Lys	Ser	Asn	Lys	His	Val	Asp	Ser	100	105	110	
Ser	Val	Pro	Val	Phe	Asn	Leu	Glu	Asp	Ile	Glu	Glu	Gly	Val	Glu	Gly	115	120	125	
Ala	Gly	Phe	Asp	Asp	Glu	Lys	Ser	Val	Leu	Met	Ser	Gln	Met	Ser	Leu	130	135	140	
Glu	Lys	Arg	Phe	Gly	Gln	Ser	Ala	Ala	Phe	Val	Ala	Ser	Thr	Leu	Met	145	150	155	160
Glu	Tyr	Gly	Gly	Val	Pro	Gln	Ser	Ser	Thr	Pro	Glu	Ser	Leu	Leu	Lys	165	170	175	
Glu	Ala	Ile	His	Val	Ile	Ser	Cys	Gly	Tyr	Glu	Asp	Lys	Ser	Glu	Trp	180	185	190	
Gly	Thr	Glu	Ile	Gly	Trp	Ile	Tyr	Gly	Ser	Val	Thr	Glu	Asp	Ile	Leu	195	200	205	
Thr	Gly	Phe	Lys	Met	His	Ala	Arg	Gly	Trp	Arg	Ser	Ile	Tyr	Cys	Met	210	215	220	
Pro	Lys	Arg	Pro	Ala	Phe	Lys	Gly	Ser	Ala	Pro	Ile	Asn	Leu	Ser	Asp	225	230	235	240
Arg	Leu	Asn	Gln	Val	Leu	Arg	Trp	Ala	Leu	Gly	Ser	Val	Glu	Ile	Leu	245	250	255	
Phe	Ser	Arg	His	Cys	Pro	Leu	Trp	Tyr	Gly	Tyr	Gly	Gly	Arg	Leu	Lys	260	265	270	
Phe	Leu	Glu	Arg	Phe	Ala	Tyr	Ile	Asn	Thr	Thr	Ile	Tyr	Pro	Leu	Thr	275	280	285	
Ser	Leu	Pro	Leu	Leu	Val	Tyr	Cys	Ile	Leu	Pro	Ala	Ile	Cys	Leu	Leu	290	295	300	
Thr	Gly	Lys	Phe	Ile	Met	Pro	Glu	Ile	Ser	Asn	Leu	Ala	Ser	Ile	Trp	305	310	315	320

Phe Ile Ala Leu Phe Leu Ser Ile Phe Ala Thr Gly Ile Leu Glu Met
 325 330 335
 Arg Trp Ser Gly Val Gly Ile Asp Glu Trp Trp Arg Asn Glu Gln Phe
 340 345 350
 Trp Val Ile Gly Gly Ile Ser Ala His Leu Phe Ala Val Phe Gln Gly
 355 360 365
 Leu Leu Lys Val Leu Ala Gly Ile Asp Thr Asn Phe Thr Val Thr Ser
 370 375 380
 Lys Ala Asn Asp Glu Glu Gly Asp Phe Ala Glu Leu Tyr Met Phe Lys
 385 390 395 400
 Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Ile Leu Ile Ile Asn Met
 405 410 415
 Val Gly Val Val Ala Gly Thr Ser Tyr Ala Ile Asn Ser Gly Tyr Gln
 420 425 430
 Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe Trp Val Ile
 435 440 445
 Val His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg Gln Asn Arg
 450 455 460
 Thr Pro Thr Ile Val Ile Val Trp Ala Val Leu Leu Ala Ser Ile Phe
 465 470 475 480
 Ser Leu Leu Trp Val Arg Val Asp Pro Phe Thr Thr Arg Leu Ala Gly
 485 490 495
 Pro Asn Ile Gln Thr Cys Gly Ile Asn Cys
 500 505

<210> 21
 <211> 1029
 <212> DNA
 <213> *Triticum aestivum*

<400> 21
 gcacgagccg ctcctcacca acggccagat ggttgatgac atcccgccgg agcagcacgc
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 gctcgtgccg tcctacatga gcggcgccgg cggcgggggc aagaggatcc acccgctccc
 120
 ttctgcagat cccaaccttc cagtgcacc gagatccatg gacccgtcca aggatctggc
 180
 cgcctacgga tatggcagcg tggcctggaa ggagagaatg gagggctgga agcagaagca
 240
 ggagcgctg cagcatgtca ggagcgaggg tggcggtgat tgggatggcg acgatgcaga
 300
 tctgccacta atggatgaag ctaggcagcc attgtccaga aaagtccta tatcatcaag
 360
 ccgaattaat ccctacagga tgattatcgt tatccggttg gtgggttttg gtttcttctt
 420
 ccactaccga gtgatgcac cggcgaaaga tgcatttgca ttgtggctca tatctgtaat
 480
 ctgtgaaatc tggtttgca tgtcctgtat tcttgatcag ttcccaaagt ggtttccaat
 540

cgagagagag acttacctgg accgtttgtc actaagggtt gacaaggaag gtcaaccctc
 600
 tcagcttgct ccaatcgact tctttgtcag tacggttgat cccacaaagg aacctccctt
 660
 ggtcacagcg aacactgtcc tttccatcct ttctgtggat tatccggttg agaaggtctc
 720
 ctgctatggt tctgatgatg gtgctgcaat gcttacgttt gaagcattgt ctgaaacatc
 780
 tgaatttgca aagaaatggg ttcctttcag caaaaagttt aatatcgagc ctggtgctcc
 840
 tgagtgggtac ttccaacaga agatagacta cctgaaagac aagggttgctg cttcatttgt
 900
 tagggagagg agggcgatga agagagaata cgaggaattc aaggtaagga tcaatgcctt
 960
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 1020
 gcctggaaa
 1029

<210> 22
 <211> 340
 <212> PRT
 <213> Triticum aestivum

<400> 22
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 His Ala Leu Val Pro Ser Tyr Met Ser Gly Gly Gly Gly Gly Lys
 20 25 30
 Arg Ile His Pro Leu Pro Phe Ala Asp Pro Asn Leu Pro Val Gln Pro
 35 40 45
 Arg Ser Met Asp Pro Ser Lys Asp Leu Ala Ala Tyr Gly Tyr Gly Ser
 50 55 60
 Val Ala Trp Lys Glu Arg Met Glu Gly Trp Lys Gln Lys Gln Glu Arg
 65 70 75 80
 Leu Gln His Val Arg Ser Glu Gly Gly Gly Asp Trp Asp Gly Asp Asp
 85 90 95
 Ala Asp Leu Pro Leu Met Asp Glu Ala Arg Gln Pro Leu Ser Arg Lys
 100 105 110
 Val Pro Ile Ser Ser Ser Arg Ile Asn Pro Tyr Arg Met Ile Ile Val
 115 120 125
 Ile Arg Leu Val Val Leu Gly Phe Phe Phe His Tyr Arg Val Met His
 130 135 140
 Pro Ala Lys Asp Ala Phe Ala Leu Trp Leu Ile Ser Val Ile Cys Glu
 145 150 155 160
 Ile Trp Phe Ala Met Ser Cys Ile Leu Asp Gln Phe Pro Lys Trp Phe
 165 170 175
 Pro Ile Glu Arg Glu Thr Tyr Leu Asp Arg Leu Ser Leu Arg Phe Asp
 180 185 190

Lys Glu Gly Gln Pro Ser Gln Leu Ala Pro Ile Asp Phe Phe Val Ser
 195 200 205
 Thr Val Asp Pro Thr Lys Glu Pro Pro Leu Val Thr Ala Asn Thr Val
 210 215 220
 Leu Ser Ile Leu Ser Val Asp Tyr Pro Val Glu Lys Val Ser Cys Tyr
 225 230 235 240
 Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe Glu Ala Leu Ser Glu
 245 250 255
 Thr Ser Glu Phe Ala Lys Lys Trp Val Pro Phe Ser Lys Lys Phe Asn
 260 265 270
 Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Gln Gln Lys Ile Asp Tyr
 275 280 285
 Leu Lys Asp Lys Val Ala Ala Ser Phe Val Arg Glu Arg Arg Ala Met
 290 295 300
 Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Leu Val Ala
 305 310 315 320
 Lys Ala Gln Lys Val Pro Glu Glu Gly Trp Thr Met Gln Asp Gly Ser
 325 330 335
 Pro Trp Pro Gly
 340

<210> 23
 <211> 1081
 <212> PRT
 <213> Arabidopsis thaliana

<400> 23
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 Leu Val Arg Ile Arg His Glu Ser Asp Gly Gly Thr Lys Pro Leu Lys
 20 25 30
 Asn Met Asn Gly Gln Ile Cys Gln Ile Cys Gly Asp Asp Val Gly Leu
 35 40 45
 Ala Glu Thr Gly Asp Val Phe Val Ala Cys Asn Glu Cys Ala Phe Pro
 50 55 60
 Val Cys Arg Pro Cys Tyr Glu Tyr Glu Arg Lys Asp Gly Thr Gln Cys
 65 70 75 80
 Cys Pro Gln Cys Lys Thr Arg Phe Arg Arg His Arg Gly Ser Pro Arg
 85 90 95
 Val Glu Gly Asp Glu Asp Glu Asp Asp Val Asp Asp Ile Glu Asn Glu
 100 105 110
 Phe Asn Tyr Ala Gln Gly Ala Asn Lys Ala Arg His Gln Arg His Gly
 115 120 125

Glu	Glu	Phe	Ser	Ser	Ser	Ser	Arg	His	Glu	Ser	Gln	Pro	Ile	Pro	Leu			
	130						135				140							
Leu	Thr	His	Gly	His	Thr	Val	Ser	Gly	Glu	Ile	Arg	Thr	Pro	Asp	Thr			
	145				150					155					160			
Gln	Ser	Val	Arg	Thr	Thr	Ser	Gly	Pro	Leu	Gly	Pro	Ser	Asp	Arg	Asn			
				165					170					175				
Ala	Ile	Ser	Ser	Pro	Tyr	Ile	Asp	Pro	Arg	Gln	Pro	Val	Pro	Val	Arg			
			180					185					190					
Ile	Val	Asp	Pro	Ser	Lys	Asp	Leu	Asn	Ser	Tyr	Gly	Leu	Gly	Asn	Val			
		195					200					205						
Asp	Trp	Lys	Glu	Arg	Val	Glu	Gly	Trp	Lys	Leu	Lys	Gln	Glu	Lys	Asn			
	210					215					220							
Met	Leu	Gln	Met	Thr	Gly	Lys	Tyr	His	Glu	Gly	Lys	Gly	Gly	Glu	Ile			
	225				230					235					240			
Glu	Gly	Thr	Gly	Ser	Asn	Gly	Glu	Glu	Leu	Gln	Met	Ala	Asp	Asp	Thr			
				245					250					255				
Arg	Leu	Pro	Met	Ser	Arg	Val	Val	Pro	Ile	Pro	Ser	Ser	Arg	Leu	Thr			
			260					265					270					
Pro	Tyr	Arg	Val	Val	Ile	Ile	Leu	Arg	Leu	Ile	Ile	Leu	Cys	Phe	Phe			
		275					280					285						
Leu	Gln	Tyr	Arg	Thr	Thr	His	Pro	Val	Lys	Asn	Ala	Tyr	Pro	Leu	Trp			
	290					295					300							
Leu	Thr	Ser	Val	Ile	Cys	Glu	Ile	Trp	Phe	Ala	Phe	Ser	Trp	Leu	Leu			
	305				310				315					320				
Asp	Gln	Phe	Pro	Lys	Trp	Tyr	Pro	Ile	Asn	Arg	Glu	Thr	Tyr	Leu	Asp			
				325					330					335				
Arg	Leu	Ala	Ile	Arg	Tyr	Asp	Arg	Asp	Gly	Glu	Pro	Ser	Gln	Leu	Val			
			340					345					350					
Pro	Val	Asp	Val	Phe	Val	Ser	Thr	Val	Asp	Pro	Leu	Lys	Glu	Pro	Pro			
		355					360					365						
Leu	Val	Thr	Ala	Asn	Thr	Val	Leu	Ser	Ile	Leu	Ser	Val	Asp	Tyr	Pro			
	370					375					380							
Val	Asp	Lys	Val	Ala	Cys	Tyr	Val	Ser	Asp	Asp	Gly	Ser	Ala	Met	Leu			
	385				390					395				400				
Thr	Phe	Glu	Ser	Leu	Ser	Glu	Thr	Ala	Glu	Phe	Ala	Lys	Lys	Trp	Val			
				405					410					415				
Pro	Phe	Cys	Lys	Lys	Phe	Asn	Ile	Glu	Pro	Arg	Ala	Pro	Glu	Phe	Tyr			
			420					425					430					
Phe	Ala	Gln	Lys	Ile	Asp	Tyr	Leu	Lys	Asp	Lys	Ile	Gln	Pro	Ser	Phe			
		435					440					445						

Val	Lys	Glu	Arg	Arg	Ala	Met	Lys	Arg	Glu	Tyr	Glu	Glu	Phe	Lys	Val			
	450					455					460							
Arg	Ile	Asn	Ala	Leu	Val	Ala	Lys	Ala	Gln	Lys	Ile	Pro	Glu	Glu	Gly			
465					470					475					480			
Trp	Thr	Met	Gln	Asp	Gly	Thr	Pro	Trp	Pro	Gly	Asn	Asn	Thr	Arg	Asp			
				485					490					495				
His	Pro	Gly	Met	Ile	Gln	Val	Phe	Leu	Gly	His	Ser	Gly	Gly	Leu	Asp			
			500					505					510					
Thr	Asp	Gly	Asn	Glu	Leu	Pro	Arg	Leu	Ile	Tyr	Val	Ser	Arg	Glu	Lys			
		515					520					525						
Arg	Pro	Gly	Phe	Gln	His	His	Lys	Lys	Ala	Gly	Ala	Met	Asn	Ala	Leu			
	530					535					540							
Ile	Arg	Val	Ser	Ala	Val	Leu	Thr	Asn	Gly	Ala	Tyr	Leu	Leu	Asn	Val			
545					550					555					560			
Asp	Cys	Asp	His	Tyr	Phe	Asn	Asn	Ser	Lys	Ala	Ile	Lys	Glu	Ala	Met			
				565					570					575				
Cys	Phe	Met	Met	Asp	Pro	Ala	Ile	Gly	Lys	Lys	Cys	Cys	Tyr	Val	Gln			
			580					585					590					
Phe	Pro	Gln	Arg	Phe	Asp	Gly	Ile	Asp	Leu	His	Asp	Arg	Tyr	Ala	Asn			
		595					600					605						
Arg	Asn	Ile	Val	Phe	Phe	Asp	Ile	Asn	Met	Lys	Gly	Leu	Asp	Gly	Ile			
	610					615					620							
Gln	Gly	Pro	Val	Tyr	Val	Gly	Thr	Gly	Cys	Cys	Phe	Asn	Arg	Gln	Ala			
625					630					635					640			
Leu	Tyr	Gly	Tyr	Asp	Pro	Val	Leu	Thr	Glu	Glu	Asp	Leu	Glu	Pro	Asn			
				645					650					655				
Ile	Ile	Val	Lys	Ser	Cys	Cys	Gly	Ser	Arg	Lys	Lys	Gly	Lys	Ser	Ser			
		660						665					670					
Lys	Lys	Tyr	Asn	Tyr	Glu	Lys	Arg	Arg	Gly	Ile	Asn	Arg	Ser	Asp	Ser			
		675					680					685						
Asn	Ala	Pro	Leu	Phe	Asn	Met	Glu	Asp	Ile	Asp	Glu	Gly	Phe	Glu	Gly			
	690					695					700							
Tyr	Asp	Asp	Glu	Arg	Ser	Ile	Leu	Met	Ser	Gln	Arg	Ser	Val	Glu	Lys			
705					710					715					720			
Arg	Phe	Gly	Gln	Ser	Pro	Val	Phe	Ile	Ala	Ala	Thr	Phe	Met	Glu	Gln			
				725					730					735				
Gly	Gly	Ile	Pro	Pro	Thr	Thr	Asn	Pro	Ala	Thr	Leu	Leu	Lys	Glu	Ala			
			740					745					750					
Ile	His	Val	Ile	Ser	Cys	Gly	Tyr	Glu	Asp	Lys	Thr	Glu	Trp	Gly	Lys			
		755					760					765						

Glu 770	Ile	Gly	Trp	Ile	Tyr	Gly 775	Ser	Val	Thr	Glu	Asp 780	Ile	Leu	Thr	Gly
Phe 785	Lys	Met	His	Ala	Arg 790	Gly	Trp	Ile	Ser	Ile 795	Tyr	Cys	Asn	Pro	Pro 800
Arg	Pro	Ala	Phe	Lys 805	Gly	Ser	Ala	Pro	Ile 810	Asn	Leu	Ser	Asp	Arg	Leu
Asn	Gln	Val	Leu 820	Arg	Trp	Ala	Leu	Gly 825	Ser	Ile	Glu	Ile	Leu 830	Leu	Ser
Arg	His	Cys 835	Pro	Ile	Trp	Tyr	Gly 840	Tyr	His	Gly	Arg	Leu 845	Arg	Leu	Leu
Glu 850	Arg	Ile	Ala	Tyr	Ile	Asn 855	Thr	Ile	Val	Tyr	Pro 860	Ile	Thr	Ser	Ile
Pro 865	Leu	Ile	Ala	Tyr	Cys 870	Ile	Leu	Pro	Ala	Phe 875	Cys	Leu	Ile	Thr	Asp 880
Arg	Phe	Ile	Ile	Pro 885	Glu	Ile	Ser	Asn	Tyr 890	Ala	Ser	Ile	Trp	Phe	Ile
Leu	Leu	Phe	Ile 900	Ser	Ile	Ala	Val	Thr 905	Gly	Ile	Leu	Glu	Leu 910	Arg	Trp
Ser	Gly	Val 915	Ser	Ile	Glu	Asp	Trp 920	Trp	Arg	Asn	Glu	Gln 925	Phe	Trp	Val
Ile 930	Gly	Gly	Thr	Ser	Ala	His 935	Leu	Phe	Ala	Val	Phe 940	Gln	Gly	Leu	Leu
Lys 945	Val	Leu	Ala	Gly	Ile 950	Asp	Thr	Asn	Phe	Thr 955	Val	Thr	Ser	Lys	Ala 960
Thr	Asp	Glu	Asp	Gly 965	Asp	Phe	Ala	Glu	Leu 970	Tyr	Ile	Phe	Lys	Trp	Thr
Ala	Leu	Leu	Ile 980	Pro	Pro	Thr	Thr	Val 985	Leu	Leu	Val	Asn	Leu 990	Ile	Gly
Ile	Val	Ala 995	Gly	Val	Ser	Tyr	Ala 1000	Val	Asn	Ser	Gly	Tyr 1005	Gln	Ser	Trp
Gly 1010	Pro	Leu	Phe	Gly	Lys	Leu 1015	Phe	Phe	Ala	Leu	Trp 1020	Val	Ile	Ala	His
Leu 1025	Tyr	Pro	Phe	Leu	Lys 1030	Gly	Leu	Leu	Gly	Arg 1035	Gln	Asn	Arg	Thr	Pro 1040
Thr	Ile	Val	Ile	Val 1045	Trp	Ser	Val	Leu	Leu 1050	Ala	Ser	Ile	Phe	Ser	Leu
Leu	Trp	Val	Arg 1060	Ile	Asn	Pro	Phe	Val 1065	Asp	Ala	Asn	Pro	Asn 1070	Ala	Asn
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 35 40 45
 Thr Val Ser Ser Glu Leu Phe Val Ala Cys Asn Glu Cys Ala Phe Pro
 50 55 60
 Val Cys Arg Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Asn Gln Ala
 65 70 75 80
 Cys Pro Gln Cys Lys Thr Arg Tyr Lys Arg Ile Lys Gly Ser Pro Arg
 85 90 95
 Val Asp Gly Asp Asp Glu Glu Glu Glu Asp Ile Asp Asp Leu Glu Tyr
 100 105 110
 Glu Phe Asp His Gly Met Asp Pro Glu His Ala Ala Glu Ala Ala Leu
 115 120 125
 Ser Ser Arg Leu Asn Thr Gly Arg Gly Gly Leu Asp Ser Ala Pro Pro
 130 135 140
 Gly Ser Gln Ile Pro Leu Leu Thr Tyr Cys Asp Glu Asp Ala Asp Met
 145 150 155 160
 Tyr Ser Asp Arg His Ala Leu Ile Val Pro Pro Ser Thr Gly Tyr Gly
 165 170 175
 Asn Arg Val Tyr Pro Ala Pro Phe Thr Asp Ser Ser Ala Pro Pro Gln
 180 185 190
 Ala Arg Ser Met Val Pro Gln Lys Asp Ile Ala Glu Tyr Gly Tyr Gly
 195 200 205
 Ser Val Ala Trp Lys Asp Arg Met Glu Val Trp Lys Arg Arg Gln Gly
 210 215 220
 Glu Lys Leu Gln Val Ile Lys His Glu Gly Gly Asn Asn Gly Arg Gly
 225 230 235 240
 Ser Asn Asp Asp Asp Glu Leu Asp Asp Pro Asp Met Pro Met Met Asp
 245 250 255
 Glu Gly Arg Gln Pro Leu Ser Arg Lys Leu Pro Ile Arg Ser Ser Arg
 260 265 270
 Ile Asn Pro Tyr Arg Met Leu Ile Leu Cys Arg Leu Ala Ile Leu Gly
 275 280 285

Leu	Phe	Phe	His	Tyr	Arg	Ile	Leu	His	Pro	Val	Asn	Asp	Ala	Tyr	Gly
290						295					300				
Leu	Trp	Leu	Thr	Ser	Val	Ile	Cys	Glu	Ile	Trp	Phe	Ala	Val	Ser	Trp
305					310					315					320
Ile	Leu	Asp	Gln	Phe	Pro	Lys	Trp	Tyr	Pro	Ile	Glu	Arg	Glu	Thr	Tyr
				325					330					335	
Leu	Asp	Arg	Leu	Ser	Leu	Arg	Tyr	Glu	Lys	Glu	Gly	Lys	Pro	Ser	Gly
			340					345					350		
Leu	Ala	Pro	Val	Asp	Val	Phe	Val	Ser	Thr	Val	Asp	Pro	Leu	Lys	Glu
		355					360					365			
Pro	Pro	Leu	Ile	Thr	Ala	Asn	Thr	Val	Leu	Ser	Ile	Leu	Ala	Val	Asp
	370					375					380				
Tyr	Pro	Val	Asp	Lys	Val	Ala	Cys	Tyr	Val	Ser	Asp	Asp	Gly	Ala	Ala
385					390					395					400
Met	Leu	Thr	Phe	Glu	Ala	Leu	Ser	Asp	Thr	Ala	Glu	Phe	Ala	Arg	Lys
				405					410					415	
Trp	Val	Pro	Phe	Cys	Lys	Lys	Phe	Asn	Ile	Glu	Pro	Arg	Ala	Pro	Glu
			420					425					430		
Trp	Tyr	Phe	Ser	Gln	Lys	Met	Asp	Tyr	Leu	Lys	Asn	Lys	Val	His	Pro
		435					440					445			
Ala	Phe	Val	Arg	Glu	Arg	Arg	Ala	Met	Lys	Arg	Asp	Tyr	Glu	Glu	Phe
	450					455					460				
Lys	Val	Lys	Ile	Asn	Ala	Leu	Val	Ala	Thr	Ala	Gln	Lys	Val	Pro	Glu
465					470					475					480
Glu	Gly	Trp	Thr	Met	Gln	Asp	Gly	Thr	Pro	Trp	Pro	Gly	Asn	Asn	Val
				485					490					495	
Arg	Asp	His	Pro	Gly	Met	Ile	Gln	Val	Phe	Leu	Gly	His	Ser	Gly	Val
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Arg	Asp	Thr	Asp	Gly	Asn	Glu	Leu	Pro	Arg	Leu	Val	Tyr	Val	Ser	Arg
		515					520					525			
Glu	Lys	Arg	Pro	Gly	Phe	Asp	His	His	Lys	Lys	Ala	Gly	Ala	Met	Asn
	530					535					540				
Ser	Leu	Ile	Arg	Val	Ser	Ala	Val	Leu	Ser	Asn	Ala	Pro	Tyr	Leu	Leu
545					550					555					560
Asn	Val	Asp	Cys	Asp	His	Tyr	Ile	Asn	Asn	Ser	Lys	Ala	Ile	Arg	Glu
				565					570					575	
Ser	Met	Cys	Phe	Met	Met	Asp	Pro	Gln	Ser	Gly	Lys	Lys	Val	Cys	Tyr
			580					585					590		
Val	Gln	Phe	Pro	Gln	Arg	Phe	Asp	Gly	Ile	Asp	Arg	His	Asp	Arg	Tyr
		595					600					605			

Ser	Asn	Arg	Asn	Val	Val	Phe	Phe	Asp	Ile	Asn	Met	Lys	Gly	Leu	Asp	
	610					615					620					
Gly	Ile	Gln	Gly	Pro	Ile	Tyr	Val	Gly	Thr	Gly	Cys	Val	Phe	Arg	Arg	
625					630					635					640	
Gln	Ala	Leu	Tyr	Gly	Phe	Asp	Ala	Pro	Lys	Lys	Lys	Lys	Pro	Pro	Gly	
				645					650					655		
Lys	Thr	Cys	Asn	Cys	Trp	Pro	Lys	Trp	Cys	Cys	Leu	Cys	Cys	Gly	Leu	
			660					665					670			
Arg	Lys	Lys	Ser	Lys	Thr	Lys	Ala	Lys	Asp	Lys	Lys	Thr	Asn	Thr	Lys	
		675					680					685				
Glu	Thr	Ser	Lys	Gln	Ile	His	Ala	Leu	Glu	Asn	Val	Asp	Glu	Gly	Val	
	690					695					700					
Ile	Val	Pro	Val	Ser	Asn	Val	Glu	Lys	Arg	Ser	Glu	Ala	Thr	Gln	Leu	
705					710					715					720	
Lys	Leu	Glu	Lys	Lys	Phe	Gly	Gln	Ser	Pro	Val	Phe	Val	Ala	Ser	Ala	
				725					730					735		
Val	Leu	Gln	Asn	Gly	Gly	Val	Pro	Arg	Asn	Ala	Ser	Pro	Ala	Cys	Leu	
			740					745					750			
Leu	Arg	Glu	Ala	Ile	Gln	Val	Ile	Ser	Cys	Gly	Tyr	Glu	Asp	Lys	Thr	
		755				760						765				
Glu	Trp	Gly	Lys	Glu	Ile	Gly	Trp	Ile	Tyr	Gly	Ser	Val	Thr	Glu	Asp	
	770					775					780					
Ile	Leu	Thr	Gly	Phe	Lys	Met	His	Cys	His	Gly	Trp	Arg	Ser	Val	Tyr	
785					790					795					800	
Cys	Met	Pro	Lys	Arg	Ala	Ala	Phe	Lys	Gly	Ser	Ala	Pro	Ile	Asn	Leu	
				805					810					815		
Ser	Asp	Arg	Leu	His	Gln	Val	Leu	Arg	Trp	Ala	Leu	Gly	Ser	Val	Glu	
			820					825					830			
Ile	Phe	Leu	Ser	Arg	His	Cys	Pro	Ile	Trp	Tyr	Gly	Tyr	Gly	Gly	Gly	
		835					840					845				
Leu	Lys	Trp	Leu	Glu	Arg	Phe	Ser	Tyr	Ile	Asn	Ser	Val	Val	Tyr	Pro	
	850					855					860					
Trp	Thr	Ser	Leu	Pro	Leu	Ile	Val	Tyr	Cys	Ser	Leu	Pro	Ala	Val	Cys	
865					870					875					880	
Leu	Leu	Thr	Gly	Lys	Phe	Ile	Val	Pro	Glu	Ile	Ser	Asn	Tyr	Ala	Gly	
				885					890					895		
Ile	Leu	Phe	Met	Leu	Met	Phe	Ile	Ser	Ile	Ala	Val	Thr	Gly	Ile	Leu	
			900					905					910			
Glu	Met	Gln	Trp	Gly	Gly	Val	Gly	Ile	Asp	Asp	Trp	Trp	Arg	Asn	Glu	
		915					920					925				

Gln Phe Trp Val Ile Gly Gly Ala Ser Ser His Leu Phe Ala Leu Phe
 930 935 940
 Gln Gly Leu Leu Lys Val Leu Ala Gly Val Asn Thr Asn Phe Thr Val
 945 950 955 960
 Thr Ser Lys Ala Ala Asp Asp Gly Ala Phe Ser Glu Leu Tyr Ile Phe
 965 970 975
 Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Leu Ile Ile Asn
 980 985 990
 Ile Ile Gly Val Ile Val Gly Val Ser Asp Ala Ile Ser Asn Gly Tyr
 995 1000 1005
 Asp Ser Trp Gly Pro Leu Phe Gly Arg Leu Phe Phe Ala Leu Trp Val
 1010 1015 1020
 Ile Val His Leu Tyr Pro Phe Leu Lys Gly Met Leu Gly Lys Gln Asp
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 Lys Met Pro Thr Ile Ile Val Val Trp Ser Ile Leu Leu Ala Ser Ile
 1045 1050 1055
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 20 25 30
 His Pro Ser Phe Val Lys Glu Arg Arg Ala Met Lys Arg Glu Tyr Glu
 35 40 45
 Glu Phe Lys Val Arg Ile Asn Ala Leu Val Ala Lys Ala Gln Lys Lys
 50 55 60
 Pro Glu Glu Gly Trp Val Met Gln Asp Gly Thr Pro Trp Pro Gly Asn
 65 70 75 80
 Asn Thr Arg Asp His Pro Gly Met Ile Gln Val Tyr Leu Gly Ser Ala
 85 90 95
 Gly Ala Leu Asp Val Asp Gly Lys Glu Leu Pro Arg Leu Val Tyr Val
 100 105 110
 Ser Arg Glu Lys Arg Pro Gly Tyr Gln His His Lys Lys Ala Gly Ala
 115 120 125

Glu	Asn	Ala	Leu	Val	Arg	Val	Ser	Ala	Val	Leu	Thr	Asn	Ala	Pro	Phe
130						135					140				
Ile	Leu	Asn	Leu	Asp	Cys	Asp	His	Tyr	Ile	Asn	Asn	Ser	Lys	Ala	Met
145					150					155					160
Arg	Glu	Ala	Met	Cys	Phe	Leu	Met	Asp	Pro	Gln	Phe	Gly	Lys	Lys	Leu
				165					170					175	
Cys	Tyr	Val	Gln	Phe	Pro	Gln	Arg	Phe	Asp	Gly	Ile	Asp	Arg	His	Asp
			180					185					190		
Arg	Tyr	Ala	Asn	Arg	Asn	Val	Val	Phe	Phe	Asp	Ile	Asn	Met	Leu	Gly
		195					200					205			
Leu	Asp	Gly	Leu	Gln	Gly	Pro	Val	Tyr	Val	Gly	Thr	Gly	Cys	Val	Phe
	210					215					220				
Asn	Arg	Gln	Ala	Leu	Tyr	Gly	Tyr	Asp	Pro	Pro	Val	Ser	Glu	Lys	Arg
225					230					235					240
Pro	Lys	Met	Thr	Cys	Asp	Cys	Trp	Pro	Ser	Trp	Cys	Cys	Cys	Cys	Cys
				245					250					255	
Gly	Gly	Ser	Arg	Lys	Lys	Ser	Lys	Lys	Lys	Gly	Glu	Lys	Lys	Gly	Leu
			260					265						270	
Leu	Gly	Gly	Leu	Leu	Tyr	Gly	Lys	Lys	Lys	Lys	Met	Met	Gly	Lys	Asn
		275					280					285			
Tyr	Val	Lys	Lys	Gly	Ser	Ala	Pro	Val	Phe	Asp	Leu	Glu	Glu	Ile	Glu
	290					295					300				
Glu	Gly	Leu	Glu	Gly	Tyr	Glu	Glu	Leu	Glu	Lys	Ser	Thr	Leu	Met	Ser
305					310					315					320
Gln	Lys	Asn	Phe	Glu	Lys	Arg	Phe	Gly	Gln	Ser	Pro	Val	Phe	Ile	Ala
				325					330					335	
Ser	Thr	Leu	Met	Glu	Asn	Gly	Gly	Leu	Pro	Glu	Gly	Thr	Asn	Ser	Thr
			340					345					350		
Ser	Leu	Ile	Lys	Glu	Ala	Ile	His	Val	Ile	Ser	Cys	Gly	Tyr	Glu	Glu
		355					360					365			
Lys	Thr	Glu	Trp	Gly	Lys	Glu	Ile	Gly	Trp	Ile	Tyr	Gly	Ser	Val	Thr
	370					375					380				
Glu	Asp	Ile	Leu	Thr	Gly	Phe	Lys	Met	His	Cys	Arg	Gly	Trp	Lys	Ser
385					390					395					400
Val	Tyr	Cys	Val	Pro	Lys	Arg	Pro	Ala	Phe	Lys	Gly	Ser	Ala	Pro	Ile
				405					410					415	
Asn	Leu	Ser	Asp	Arg	Leu	His	Gln	Val	Leu	Arg	Trp	Ala	Leu	Gly	Ser
			420					425					430		
Val	Glu	Ile	Phe	Leu	Ser	Arg	His	Cys	Pro	Leu	Trp	Tyr	Gly	Tyr	Gly
		435					440					445			

Gly Lys Leu Lys Trp Leu Glu Arg Leu Ala Tyr Ile Asn Thr Ile Val
 450 455 460
 Tyr Pro Phe Thr Ser Ile Pro Leu Leu Ala Tyr Cys Thr Ile Pro Ala
 465 470 475 480
 Val Cys Leu Leu Thr Gly Lys Phe Ile Ile Pro Thr Leu Ser Asn Leu
 485 490 495
 Thr Ser Val Trp Phe Leu Ala Leu Phe Leu Ser Ile Ile Ala Thr Gly
 500 505 510
 Val Leu Glu Leu Arg Trp Ser Gly Val Ser Ile Gln Asp Trp Trp Arg
 515 520 525
 Asn Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ala His Leu Phe Ala
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 Val Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Val Asp Thr Asn Phe
 545 550 555 560
 Thr Val Thr Ala Lys Ala Ala Asp Asp Thr Glu Phe Gly Glu Leu Tyr
 565 570 575
 Leu Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Ile Ile
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 Leu Asn Met Val Gly Val Val Ala Gly Val Ser Asp Ala Ile Asn Asn
 595 600 605
 Gly Tyr Gly Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe
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 Trp Val Ile Leu His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg
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 Gln Asn Arg Thr Pro Thr Ile Val Val Leu Trp Ser Ile Leu Leu Ala
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 35 40 45

Pro	Pro	Leu	Val	Thr	Ala	Asn	Thr	Ile	Leu	Ser	Ile	Leu	Ala	Val	Asp
	370					375					380				
Tyr	Pro	Val	Glu	Lys	Val	Ser	Cys	Tyr	Leu	Ser	Asp	Asp	Gly	Gly	Ala
385					390					395					400
Leu	Leu	Ser	Phe	Glu	Ala	Met	Ala	Glu	Ala	Ala	Ser	Phe	Ala	Asp	Leu
				405				410						415	
Trp	Val	Pro	Phe	Cys	Arg	Lys	His	Asn	Ile	Glu	Pro	Arg	Asn	Pro	Asp
			420					425					430		
Ser	Tyr	Phe	Ser	Leu	Lys	Ile	Asp	Pro	Thr	Lys	Asn	Lys	Ser	Arg	Ile
		435					440					445			
Asp	Phe	Val	Lys	Asp	Arg	Arg	Lys	Ile	Lys	Arg	Glu	Tyr	Asp	Glu	Phe
	450					455					460				
Lys	Val	Arg	Ile	Asn	Gly	Leu	Pro	Asp	Ser	Ile	Arg	Arg	Arg	Ser	Asp
465					470					475					480
Ala	Phe	Asn	Ala	Arg	Glu	Glu	Met	Lys	Ala	Leu	Lys	Gln	Met	Arg	Glu
				485					490					495	
Ser	Gly	Gly	Asp	Pro	Thr	Glu	Pro	Val	Lys	Val	Pro	Lys	Ala	Thr	Trp
			500					505					510		
Met	Ala	Asp	Gly	Thr	His	Trp	Pro	Gly	Thr	Trp	Ala	Ala	Ser	Thr	Arg
		515					520					525			
Glu	His	Ser	Lys	Gly	Asp	His	Ala	Gly	Ile	Leu	Gln	Val	Met	Leu	Lys
	530					535					540				
Pro	Pro	Ser	Ser	Asp	Pro	Leu	Ile	Gly	Asn	Ser	Asp	Asp	Lys	Val	Ile
545					550					555					560
Asp	Phe	Ser	Asp	Thr	Asp	Thr	Arg	Leu	Pro	Met	Phe	Val	Tyr	Val	Ser
				565					570					575	
Arg	Glu	Lys	Arg	Pro	Gly	Tyr	Asp	His	Asn	Lys	Lys	Ala	Gly	Ala	Met
			580					585					590		
Asn	Ala	Leu	Val	Arg	Ala	Ser	Ala	Ile	Leu	Ser	Asn	Gly	Pro	Phe	Ile
		595					600					605			
Leu	Asn	Leu	Asp	Cys	Asp	His	Tyr	Ile	Tyr	Asn	Cys	Lys	Ala	Val	Arg
	610					615					620				
Glu	Gly	Met	Cys	Phe	Met	Met	Asp	Arg	Gly	Gly	Glu	Asp	Ile	Cys	Tyr
625					630					635					640
Ile	Gln	Phe	Pro	Gln	Arg	Phe	Glu	Gly	Ile	Asp	Pro	Ser	Asp	Arg	Tyr
				645					650					655	
Ala	Asn	Asn	Asn	Thr	Val	Phe	Phe	Asp	Gly	Asn	Met	Arg	Ala	Leu	Asp
			660					665					670		
Gly	Val	Gln	Gly	Pro	Val	Tyr	Val	Gly	Thr	Gly	Thr	Met	Phe	Arg	Arg
		675					680					685			

Phe	Ala	Leu	Tyr	Gly	Phe	Asp	Pro	Pro	Asn	Pro	Asp	Lys	Leu	Leu	Glu	690	695	700	
Lys	Lys	Glu	Ser	Glu	Thr	Glu	Ala	Leu	Thr	Thr	Ser	Asp	Phe	Asp	Pro	705	710	715	720
Asp	Leu	Asp	Val	Thr	Gln	Leu	Pro	Lys	Arg	Phe	Gly	Asn	Ser	Thr	Leu	725	730	735	
Leu	Ala	Glu	Ser	Ile	Pro	Ile	Ala	Glu	Phe	Gln	Gly	Arg	Pro	Leu	Ala	740	745	750	
Asp	His	Pro	Ala	Val	Lys	Tyr	Gly	Arg	Pro	Pro	Gly	Ala	Leu	Arg	Val	755	760	765	
Pro	Arg	Asp	Pro	Leu	Asp	Ala	Thr	Thr	Val	Ala	Glu	Ser	Val	Ser	Val	770	775	780	
Ile	Ser	Cys	Trp	Tyr	Glu	Asp	Lys	Thr	Glu	Trp	Gly	Asp	Arg	Val	Gly	785	790	795	800
Trp	Ile	Tyr	Gly	Ser	Val	Thr	Glu	Asp	Val	Val	Thr	Gly	Tyr	Arg	Met	805	810	815	
His	Asn	Arg	Gly	Trp	Arg	Ser	Val	Tyr	Cys	Ile	Thr	Lys	Arg	Asp	Ser	820	825	830	
Phe	Arg	Gly	Ser	Ala	Pro	Ile	Asn	Leu	Thr	Asp	Arg	Leu	His	Gln	Val	835	840	845	
Leu	Arg	Trp	Ala	Thr	Gly	Ser	Val	Glu	Ile	Phe	Phe	Ser	Arg	Asn	Asn	850	855	860	
Ala	Ile	Leu	Ala	Ser	Lys	Arg	Leu	Lys	Phe	Leu	Gln	Arg	Leu	Ala	Tyr	865	870	875	880
Leu	Asn	Val	Gly	Ile	Tyr	Pro	Phe	Thr	Ser	Leu	Phe	Leu	Ile	Leu	Tyr	885	890	895	
Cys	Phe	Leu	Pro	Ala	Phe	Ser	Leu	Phe	Ser	Gly	Gln	Phe	Ile	Val	Arg	900	905	910	
Thr	Leu	Ser	Ile	Ser	Phe	Leu	Val	Tyr	Leu	Leu	Met	Ile	Thr	Ile	Cys	915	920	925	
Leu	Ile	Gly	Leu	Ala	Val	Leu	Glu	Val	Lys	Trp	Ser	Gly	Ile	Gly	Leu	930	935	940	
Glu	Glu	Trp	Trp	Arg	Asn	Glu	Gln	Trp	Trp	Leu	Ile	Ser	Gly	Thr	Ser	945	950	955	960
Ser	His	Leu	Tyr	Ala	Val	Val	Gln	Gly	Val	Leu	Lys	Val	Ile	Ala	Gly	965	970	975	
Ile	Glu	Ile	Ser	Phe	Thr	Leu	Thr	Thr	Lys	Ser	Gly	Gly	Asp	Asp	Asn	980	985	990	
Glu	Asp	Ile	Tyr	Ala	Asp	Leu	Tyr	Ile	Val	Lys	Trp	Ser	Ser	Leu	Met	995	1000	1005	

Ile Pro Pro Ile Val Ile Ala Met Val Asn Ile Ile Ala Ile Val Val
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 Ala Phe Ile Arg Thr Ile Tyr Gln Ala Val Pro Gln Trp Ser Lys Leu
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 Ile Gly Gly Ala Phe Phe Ser Phe Trp Val Leu Ala His Leu Tyr Pro
 1045 1050 1055
 Phe Ala Lys Gly Leu Met Gly Arg Arg Gly Lys Thr Pro Thr Ile Val
 1060 1065 1070
 Phe Val Trp Ala Gly Leu Ile Ala Ile Thr Ile Ser Leu Leu Trp Thr
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 35 40 45
 Glu Gly Asp Leu Phe Val Ala Cys Asn Glu Cys Gly Phe Pro Ala Cys
 50 55 60
 Arg Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Thr Gln Asn Cys Pro
 65 70 75 80
 Gln Cys Lys Thr Arg Tyr Lys Arg Leu Arg Gly Ser Pro Arg Val Glu
 85 90 95
 Gly Asp Glu Asp Glu Glu Asp Ile Asp Asp Ile Glu Tyr Glu Phe Asn
 100 105 110
 Ile Glu His Glu Gln Asp Lys His Lys His Ser Ala Glu Ala Met Leu
 115 120 125
 Tyr Gly Lys Met Ser Tyr Gly Arg Gly Pro Glu Asp Asp Glu Asn Gly
 130 135 140
 Arg Phe Pro Pro Val Ile Ala Gly Gly His Ser Gly Glu Phe Pro Val
 145 150 155 160
 Gly Gly Gly Tyr Gly Asn Gly Glu His Gly Leu His Lys Arg Val His
 165 170 175

Pro	Tyr	Pro	Ser	Ser	Glu	Ala	Gly	Ser	Glu	Gly	Gly	Trp	Arg	Glu	Arg		
			180					185					190				
Met	Asp	Asp	Trp	Lys	Leu	Gln	His	Gly	Asn	Leu	Gly	Pro	Glu	Pro	Asp		
		195					200					205					
Asp	Asp	Pro	Glu	Met	Gly	Leu	Ile	Asp	Glu	Ala	Arg	Gln	Pro	Leu	Ser		
	210					215					220						
Arg	Lys	Val	Pro	Ile	Ala	Ser	Ser	Lys	Ile	Asn	Pro	Tyr	Arg	Met	Val		
225					230					235					240		
Ile	Val	Ala	Arg	Leu	Val	Ile	Leu	Ala	Val	Phe	Leu	Arg	Tyr	Arg	Leu		
				245					250					255			
Leu	Asn	Pro	Val	His	Asp	Ala	Leu	Gly	Leu	Trp	Leu	Thr	Ser	Val	Ile		
			260					265					270				
Cys	Glu	Ile	Trp	Phe	Ala	Val	Ser	Trp	Ile	Leu	Asp	Gln	Phe	Pro	Lys		
		275					280					285					
Trp	Phe	Pro	Ile	Glu	Arg	Glu	Thr	Tyr	Leu	Asp	Arg	Leu	Ser	Leu	Arg		
	290					295					300						
Tyr	Glu	Arg	Glu	Gly	Glu	Pro	Asn	Met	Leu	Ala	Pro	Val	Asp	Val	Phe		
305					310					315					320		
Val	Ser	Thr	Val	Asp	Pro	Leu	Lys	Glu	Pro	Pro	Leu	Val	Thr	Ser	Asn		
				325					330					335			
Thr	Val	Leu	Ser	Ile	Leu	Ala	Met	Asp	Tyr	Pro	Val	Glu	Lys	Ile	Ser		
			340					345					350				
Cys	Tyr	Val	Ser	Asp	Asp	Gly	Ala	Ser	Met	Leu	Thr	Phe	Glu	Ser	Leu		
		355					360					365					
Ser	Glu	Thr	Ala	Glu	Phe	Ala	Arg	Lys	Trp	Val	Pro	Phe	Cys	Lys	Lys		
	370					375					380						
Phe	Ser	Ile	Glu	Pro	Arg	Ala	Pro	Glu	Met	Tyr	Phe	Thr	Leu	Lys	Val		
385					390					395					400		
Asp	Tyr	Leu	Gln	Asp	Lys	Val	His	Pro	Thr	Phe	Val	Lys	Glu	Arg	Arg		
				405					410					415			
Ala	Met	Lys	Arg	Glu	Tyr	Glu	Glu	Phe	Lys	Val	Arg	Ile	Asn	Ala	Gln		
			420					425					430				
Val	Ala	Lys	Ala	Ser	Lys	Val	Pro	Leu	Glu	Gly	Trp	Ile	Met	Gln	Asp		
		435					440					445					
Gly	Thr	Pro	Trp	Pro	Gly	Asn	Asn	Thr	Lys	Asp	His	Pro	Gly	Met	Ile		
	450					455					460						
Gln	Val	Phe	Leu	Gly	His	Ser	Gly	Gly	Phe	Asp	Val	Glu	Gly	His	Glu		
465					470					475					480		
Leu	Pro	Arg	Leu	Val	Tyr	Val	Ser	Arg	Glu	Lys	Arg	Pro	Gly	Phe	Gln		
				485					490					495			

His His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Val Ala Gly
 500 505 510
 Val Leu Thr Asn Ala Pro Phe Met Leu Asn Leu Asp Cys Asp His Tyr
 515 520 525
 Val Asn Asn Ser Lys Ala Val Arg Glu Ala Met Cys Phe Leu Met Asp
 530 535 540
 Pro Gln Ile Gly Lys Lys Val Cys Tyr Val Gln Phe Pro Gln Arg Phe
 545 550 555 560
 Asp Gly Ile Asp Thr Asn Asp Arg Tyr Ala Asn Arg Asn Thr Val Phe
 565 570 575
 Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Ile Gln Gly Pro Val Tyr
 580 585 590
 Val Gly Thr Gly Cys Val Phe Lys Arg Gln Ala Leu Tyr Gly Tyr Glu
 595 600 605
 Pro Pro Lys Gly Pro Lys Arg Pro Lys Met Ile Ser Cys Gly Cys Cys
 610 615 620
 Pro Cys Phe Gly Arg Arg Arg Lys Asn Lys Lys Phe Ser Lys Asn Asp
 625 630 635 640
 Met Asn Gly Asp Val Ala Ala Leu Gly Gly Ala Glu Gly Asp Lys Glu
 645 650 655
 His Leu Met Phe Glu Met Asn Phe Glu Lys Thr Phe Gly Gln Ser Ser
 660 665 670
 Ile Phe Val Thr Ser Thr Leu Met Glu Glu Gly Gly Val Pro Pro Ser
 675 680 685
 Ser Ser Pro Ala Val Leu Leu Lys Glu Ala Ile His Val Ile Ser Cys
 690 695 700
 Gly Tyr Glu Asp Lys Thr Glu Trp Gly Thr Glu Leu Gly Trp Ile Tyr
 705 710 715 720
 Gly Ser Ile Thr Glu Asp Ile Leu Thr Gly Phe Lys Met His Cys Arg
 725 730 735
 Gly Trp Arg Ser Ile Tyr Cys Met Pro Lys Arg Pro Ala Phe Lys Gly
 740 745 750
 Ser Ala Pro Ile Asn Leu Ser Asp Arg Leu Asn Gln Val Leu Arg Trp
 755 760 765
 Ala Leu Gly Ser Val Glu Ile Phe Phe Ser Arg His Ser Pro Leu Trp
 770 775 780
 Tyr Gly Tyr Lys Gly Gly Lys Leu Lys Trp Leu Glu Arg Phe Ala Tyr
 785 790 795 800
 Ala Asn Thr Thr Ile Tyr Pro Phe Thr Ser Ile Pro Leu Leu Ala Tyr
 805 810 815

Cys Ile Leu Pro Ala Ile Cys Leu Leu Thr Asp Lys Phe Ile Met Pro
 820 825 830
 Pro Ile Ser Thr Phe Ala Ser Leu Phe Phe Ile Ser Leu Phe Met Ser
 835 840 845
 Ile Ile Val Thr Gly Ile Leu Glu Leu Arg Trp Ser Gly Val Ser Ile
 850 855 860
 Glu Glu Trp Trp Arg Asn Glu Gln Phe Trp Val Ile Gly Gly Ile Ser
 865 870 875 880
 Ala His Leu Phe Ala Val Val Gln Gly Leu Leu Lys Ile Leu Ala Gly
 885 890 895
 Ile Asp Thr Asn Phe Thr Val Thr Ser Lys Ala Thr Asp Asp Asp Asp
 900 905 910
 Phe Gly Glu Leu Tyr Ala Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro
 915 920 925
 Thr Thr Val Leu Ile Ile Asn Ile Val Gly Val Val Ala Gly Ile Ser
 930 935 940
 Asp Ala Ile Asn Asn Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys
 945 950 955 960
 Leu Phe Phe Ser Phe Trp Val Ile Val His Leu Tyr Pro Phe Leu Lys
 965 970 975
 Gly Leu Met Gly Arg Gln Asn Arg Thr Pro Thr Ile Val Val Ile Trp
 980 985 990
 Ser Val Leu Leu Ala Ser Ile Phe Ser Leu Leu Trp Val Arg Ile Asp
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 20 25 30
 Lys Trp Val Pro Phe Cys Lys Lys Tyr Asn Ile Glu Pro Arg Ala Pro
 35 40 45
 Glu Trp Tyr Phe Ala Gln Lys Ile Asp Tyr Leu Lys Asp Lys Val Gln
 50 55 60

Thr	Ser	Phe	Val	Lys	Glu	Arg	Arg	Ala	Met	Lys	Arg	Glu	Tyr	Glu	Glu	65	70	75	80
Phe	Lys	Val	Arg	Val	Asn	Gly	Leu	Val	Ala	Lys	Ala	Gln	Lys	Val	Pro	85	90	95	
Glu	Glu	Gly	Trp	Ile	Met	Gln	Asp	Gly	Thr	Pro	Trp	Pro	Gly	Asn	Asn	100	105	110	
Thr	Arg	Asp	His	Pro	Gly	Met	Ile	Gln	Val	Phe	Leu	Gly	Gln	Ser	Gly	115	120	125	
Gly	Leu	Asp	Ala	Glu	Gly	Asn	Glu	Leu	Pro	Arg	Leu	Val	Tyr	Val	Ser	130	135	140	
Arg	Glu	Lys	Arg	Pro	Gly	Phe	Gln	His	His	Lys	Lys	Ala	Gly	Ala	Met	145	150	155	160
Asn	Ala	Leu	Val	Arg	Val	Ser	Ala	Val	Leu	Thr	Asn	Gly	Ala	Phe	Leu	165	170	175	
Leu	Asn	Leu	Asp	Cys	Asp	His	Tyr	Ile	Asn	Asn	Ser	Lys	Ala	Leu	Arg	180	185	190	
Glu	Ala	Met	Cys	Phe	Leu	Met	Asp	Pro	Asn	Leu	Gly	Lys	Gln	Val	Cys	195	200	205	
Tyr	Val	Gln	Phe	Pro	Gln	Arg	Phe	Asp	Gly	Ile	Asp	Arg	Asn	Asp	Arg	210	215	220	
Tyr	Ala	Asn	Arg	Asn	Thr	Val	Phe	Phe	Asp	Ile	Asn	Leu	Arg	Gly	Leu	225	230	235	240
Asp	Gly	Ile	Gln	Gly	Pro	Val	Tyr	Val	Gly	Thr	Gly	Cys	Val	Phe	Asn	245	250	255	
Arg	Thr	Ala	Leu	Tyr	Gly	Tyr	Glu	Pro	Pro	Leu	Lys	Pro	Lys	His	Arg	260	265	270	
Lys	Thr	Gly	Ile	Leu	Ser	Ser	Leu	Cys	Gly	Gly	Ser	Arg	Lys	Lys	Ser	275	280	285	
Ser	Lys	Ser	Ser	Lys	Lys	Gly	Ser	Asp	Lys	Lys	Lys	Ser	Gly	Lys	His	290	295	300	
Val	Asp	Ser	Thr	Val	Pro	Val	Phe	Asn	Leu	Glu	Asp	Ile	Glu	Glu	Gly	305	310	315	320
Val	Glu	Gly	Ala	Gly	Phe	Asp	Asp	Glu	Lys	Ser	Leu	Leu	Met	Ser	Gln	325	330	335	
Met	Ser	Leu	Glu	Lys	Arg	Phe	Gly	Gln	Ser	Ala	Val	Phe	Val	Ala	Ser	340	345	350	
Thr	Leu	Met	Glu	Asn	Gly	Gly	Val	Pro	Gln	Ser	Ala	Thr	Pro	Glu	Thr	355	360	365	
Leu	Leu	Lys	Glu	Ala	Ile	His	Val	Ile	Ser	Cys	Gly	Tyr	Glu	Asp	Lys	370	375	380	

Thr	Asp	Trp	Gly	Ser	Glu	Ile	Gly	Trp	Ile	Tyr	Gly	Ser	Val	Thr	Glu	385	390	395	400
Asp	Ile	Leu	Thr	Gly	Phe	Lys	Met	His	Ala	Arg	Gly	Trp	Arg	Ser	Ile	405	410	415	
Tyr	Cys	Met	Pro	Lys	Arg	Pro	Ala	Phe	Lys	Gly	Ser	Ala	Pro	Ile	Asn	420	425	430	
Leu	Ser	Asp	Arg	Leu	Asn	Gln	Val	Leu	Arg	Trp	Ala	Leu	Gly	Ser	Val	435	440	445	
Glu	Ile	Leu	Phe	Ser	Arg	His	Cys	Pro	Ile	Trp	Tyr	Gly	Tyr	Ser	Gly	450	455	460	
Arg	Leu	Lys	Trp	Leu	Glu	Arg	Phe	Ala	Tyr	Val	Asn	Thr	Thr	Ile	Tyr	465	470	475	480
Pro	Val	Thr	Ala	Ile	Pro	Leu	Leu	Met	Tyr	Cys	Thr	Leu	Pro	Ala	Val	485	490	495	
Cys	Leu	Leu	Thr	Asn	Lys	Phe	Ile	Ile	Pro	Gln	Ile	Ser	Asn	Leu	Ala	500	505	510	
Ser	Ile	Trp	Phe	Ile	Ser	Leu	Phe	Leu	Ser	Ile	Phe	Ala	Thr	Gly	Ile	515	520	525	
Leu	Lys	Met	Lys	Trp	Asn	Gly	Val	Gly	Ile	Asp	Gln	Trp	Trp	Arg	Asn	530	535	540	
Glu	Gln	Phe	Trp	Val	Ile	Gly	Gly	Val	Ser	Ala	His	Leu	Phe	Ala	Val	545	550	555	560
Phe	Gln	Gly	Leu	Leu	Lys	Val	Leu	Ala	Gly	Ile	Asp	Thr	Asn	Phe	Thr	565	570	575	
Val	Thr	Ser	Lys	Ala	Ser	Asp	Glu	Asp	Gly	Asp	Phe	Ala	Glu	Leu	Tyr	580	585	590	
Met	Phe	Lys	Trp	Thr	Thr	Leu	Leu	Ile	Pro	Pro	Thr	Thr	Leu	Leu	Ile	595	600	605	
Ile	Asn	Leu	Val	Gly	Val	Val	Ala	Gly	Ile	Ser	Tyr	Val	Ile	Asn	Ser	610	615	620	
Gly	Tyr	Gln	Ser	Trp	Gly	Pro	Leu	Phe	Gly	Lys	Leu	Phe	Phe	Ala	Phe	625	630	635	640
Trp	Val	Ile	Ile	His	Leu	Tyr	Pro	Phe	Leu	Lys	Gly	Leu	Met	Gly	Arg	645	650	655	
Gln	Asn	Arg	Thr	Pro	Thr	Ile	Val	Val	Val	Trp	Ser	Ile	Leu	Leu	Ala	660	665	670	
Ser	Ile	Phe	Ser	Leu	Leu	Trp	Val	Arg	Ile	Asp	Pro	Phe	Thr	Thr	Arg	675	680	685	
Val	Thr	Gly	Pro	Asp	Val	Glu	Gln	Cys	Gly	Ile	Asn	Cys				690	695	700	

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			20					25					30		
Gly	Gln	Thr	Cys	Gln	Ile	Cys	Arg	Asp	Glu	Ile	Glu	Leu	Thr	Val	Asp
			35				40					45			
Gly	Glu	Pro	Phe	Val	Ala	Cys	Asn	Glu	Cys	Ala	Phe	Pro	Val	Cys	Arg
	50					55					60				
Pro	Cys	Tyr	Glu	Tyr	Glu	Arg	Arg	Glu	Gly	Asn	Gln	Ala	Cys	Pro	Gln
65					70					75					80
Cys	Lys	Thr	Arg	Phe	Lys	Arg	Leu	Lys	Gly	Ser	Pro	Arg	Val	Glu	Gly
				85					90					95	
Asp	Glu	Glu	Glu	Asp	Asp	Ile	Asp	Asp	Leu	Asp	Asn	Glu	Phe	Glu	Tyr
			100					105					110		
Gly	Asn	Asn	Gly	Ile	Gly	Phe	Asp	Gln	Val	Ser	Glu	Gly	Met	Ser	Ile
		115					120					125			
Ser	Arg	Arg	Asn	Ser	Gly	Phe	Pro	Gln	Ser	Asp	Leu	Asp	Ser	Ala	Pro
	130					135					140				
Pro	Gly	Ser	Gln	Ile	Pro	Leu	Leu	Thr	Tyr	Gly	Asp	Glu	Asp	Val	Glu
145					150					155					160
Ile	Ser	Ser	Asp	Arg	His	Ala	Leu	Ile	Val	Pro	Pro	Ser	Leu	Gly	Gly
				165					170					175	
His	Gly	Asn	Arg	Val	His	Pro	Val	Ser	Leu	Ser	Asp	Pro	Thr	Val	Ala
			180					185					190		
Ala	His	Arg	Arg	Leu	Met	Val	Pro	Gln	Lys	Asp	Leu	Ala	Val	Tyr	Gly
		195					200					205			
Tyr	Gly	Ser	Val	Ala	Trp	Lys	Asp	Arg	Met	Glu	Glu	Trp	Lys	Arg	Lys
	210					215					220				
Gln	Asn	Glu	Lys	Leu	Gln	Val	Val	Arg	His	Glu	Gly	Asp	Pro	Asp	Phe
225					230					235					240
Glu	Asp	Gly	Asp	Asp	Ala	Asp	Phe	Pro	Met	Met	Asp	Glu	Gly	Arg	Gln
				245					250					255	
Pro	Leu	Ser	Met	Lys	Ile	Pro	Ile	Lys	Ser	Ser	Lys	Ile	Asn	Pro	Tyr
			260					265					270		
Arg	Met	Leu	Ile	Val	Leu	Arg	Leu	Val	Ile	Leu	Gly	Leu	Phe	Phe	His
		275					280					285			

Tyr Arg Ile Leu His Pro Val Lys Asp Ala Tyr Ala Leu Trp Leu Ile
 290 295 300
 Ser Val Ile Cys Glu Ile Trp Phe Ala Val Ser Trp Val Leu Asp Gln
 305 310 315 320
 Phe Pro Lys Trp Tyr Pro Ile Glu Arg Glu Thr Tyr Leu Asp Arg Leu
 325 330 335
 Ser Leu Arg Tyr Glu Lys Glu Gly Lys Pro Ser Gly Leu Ser Pro Val
 340 345 350
 Asp Val Phe Val Ser Thr Val Asp Pro Leu Lys Glu Pro Pro Leu Ile
 355 360 365
 Thr Ala Asn Thr Val Leu Ser Ile Leu Ala Val Asp Tyr Pro Val Asp
 370 375 380
 Lys Val Ala Cys Tyr Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe
 385 390 395 400
 Glu Ala Leu Ser Glu Thr Ala Glu Phe Ala Arg Lys Trp Val Pro Phe
 405 410 415
 Cys Lys Lys Tyr Cys Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Cys
 420 425 430
 His Lys Met Asp Tyr Leu Lys Asn Lys Val His Pro Ala Phe Val Arg
 435 440 445
 Glu Arg Arg Ala Met Lys Arg Asp Tyr Glu Glu Phe Lys Val Lys Ile
 450 455 460
 Asn Ala Leu Val Ala Thr Ala Gln Lys Val Pro Glu Asp Gly Trp Thr
 465 470 475 480
 Met Gln Asp Gly Thr Pro Trp Pro Gly Asn Ser Val Arg Asp His Pro
 485 490 495
 Gly Met Ile Gln Val Phe Leu Gly Ser Asp Gly Val Arg Asp Val Glu
 500 505 510
 Asn Asn Glu Leu Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro
 515 520 525
 Gly Phe Asp His His Lys Lys Ala Gly Ala Met Asn Ser Leu Ile Arg
 530 535 540
 Val Ser Gly Val Leu Ser Asn Ala Pro Tyr Leu Leu Asn Val Asp Cys
 545 550 555 560
 Asp His Tyr Ile Asn Asn Ser Lys Ala Leu Arg Glu Ala Met Cys Phe
 565 570 575
 Met Met Asp Pro Gln Ser Gly Lys Lys Ile Cys Tyr Val Gln Phe Pro
 580 585 590
 Gln Arg Phe Asp Gly Ile Asp Arg His Asp Arg Tyr Ser Asn Arg Asn
 595 600 605

Val Val Phe Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Leu Gln Gly
 610 615 620
 Pro Ile Tyr Val Gly Thr Gly Cys Val Phe Arg Arg Gln Ala Leu Tyr
 625 630 635 640
 Gly Phe Asp Ala Pro Lys Lys Lys Lys Gly Pro Arg Lys Thr Cys Asn
 645 650 655
 Cys Trp Pro Lys Trp Cys Leu Leu Cys Phe Gly Ser Arg Lys Asn Arg
 660 665 670
 Lys Ala Lys Thr Val Ala Ala Asp Lys Lys Lys Lys Asn Arg Glu Ala
 675 680 685
 Ser Lys Gln Ile His Ala Leu Glu Asn Ile Glu Glu Gly Arg Gly His
 690 695 700
 Lys Val Leu Asn Val Glu Gln Ser Thr Glu Ala Met Gln Met Lys Leu
 705 710 715 720
 Gln Lys Lys Tyr Gly Gln Ser Pro Val Phe Val Ala Ser Ala Arg Leu
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 Glu Asn Gly Gly Met Ala Arg Asn Ala Ser Pro Ala Cys Leu Leu Lys
 740 745 750
 Glu Ala Ile Gln Val Ile Ser Arg Gly Tyr Glu Asp Lys Thr Glu Trp
 755 760 765
 Gly Lys Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu
 770 775 780
 Thr Gly Ser Lys Met His Ser His Gly Trp Arg His Val Tyr Cys Thr
 785 790 795 800
 Pro Lys Leu Ala Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp
 805 810 815
 Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly Ser Val Glu Ile Phe
 820 825 830
 Leu Ser Arg His Cys Pro Ile Trp Tyr Gly Tyr Gly Gly Gly Leu Lys
 835 840 845
 Trp Leu Glu Arg Leu Ser Tyr Ile Asn Ser Val Val Tyr Pro Trp Thr
 850 855 860
 Ser Leu Pro Leu Ile Val Tyr Cys Ser Leu Pro Ala Ile Cys Leu Leu
 865 870 875 880
 Thr Gly Lys Phe Ile Val Pro Glu Ile Ser Asn Tyr Ala Ser Ile Leu
 885 890 895
 Phe Met Ala Leu Phe Ser Ser Ile Ala Ile Thr Gly Ile Leu Glu Met
 900 905 910
 Gln Trp Gly Lys Val Gly Ile Asp Asp Trp Trp Arg Asn Glu Gln Phe
 915 920 925

Trp	Val	Ile	Gly	Gly	Val	Ser	Ala	His	Leu	Phe	Ala	Leu	Phe	Gln	Gly	
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Leu	Leu	Lys	Val	Leu	Ala	Gly	Val	Asp	Thr	Asn	Phe	Thr	Val	Thr	Ser	
945					950					955					960	
Lys	Ala	Ala	Asp	Asp	Gly	Glu	Phe	Ser	Asp	Leu	Tyr	Leu	Phe	Lys	Trp	
				965					970					975		
Thr	Ser	Leu	Leu	Ile	Pro	Pro	Met	Thr	Leu	Leu	Ile	Ile	Asn	Val	Ile	
			980					985					990			
Gly	Val	Ile	Val	Gly	Val	Ser	Asp	Ala	Ile	Ser	Asn	Gly	Tyr	Asp	Ser	
	995						1000					1005				
Trp	Gly	Pro	Leu	Phe	Gly	Arg	Leu	Phe	Phe	Ala	Leu	Trp	Val	Ile	Ile	
1010						1015					1020					
His	Leu	Tyr	Pro	Phe	Leu	Lys	Gly	Leu	Leu	Gly	Lys	Gln	Asp	Arg	Met	
1025					1030					1035					1040	
Pro	Thr	Ile	Ile	Val	Val	Trp	Ser	Ile	Leu	Leu	Ala	Ser	Ile	Leu	Thr	
				1045					1050					1055		
Leu	Leu	Trp	Val	Arg	Val	Asn	Pro	Phe	Val	Ala	Lys	Gly	Gly	Pro	Ile	
			1060					1065					1070			
Leu	Glu	Ile	Cys	Gly	Leu	Asp	Cys	Leu								
	1075						1080									